PATENT ABSTRACTS OF JAPAN

(11)Publication number : 05-244025

(43)Date of publication of application : 21.09.1993

(51)Int.Cl. H04B 1/10
H04B 7/26

(21)Application number : 04-079275

(22)Date of filing : 29.02.1992

(71)Applicant : NEC CORP

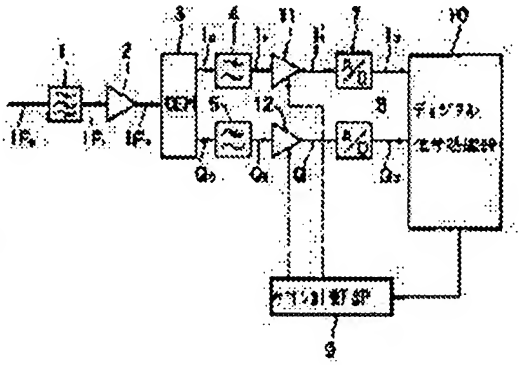
(72)Inventor : HASHIMOTO KAZUYA

(54) DIGITAL MOBILE RADIO RECEIVER

(57)Abstract:

PURPOSE: To prevent the deterioration in the reception characteristic by preventing the deterioration in the resolution performance when a limiter amplifier is saturated due to a disturbing wave in the digital mobile radio receiver employing a limiter amplifier.

CONSTITUTION: Variable gain preamplifiers 11, 12 are provided between low pass filters 4, 5 and A/D converters 7, 8 and the gain of the preamplifiers 11, 12 is controlled by a gain control section 9with a command from a digital signal processing section 10. The digital signal processing section 10 monitors the amplitude level of the signals I, Q after the output of a limiter amplifier 1 is detected to control the gain of the preamplifiers 11, 12 so as to keep an input level of the A/D converters 7, 8 constant.



LEGAL STATUS

[Date of request for examination] 29.02.1996

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or

application converted registration]	
[Date of final disposal for application]	
[Patent number]	2773524
[Date of registration]	24.04.1998
[Number of appeal against examiner's decision of rejection]	
[Date of requesting appeal against examiner's decision of rejection]	
[Date of extinction of right]	24.04.2001

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] The limiter amplifier which amplifies an intermediate frequency signal, and the rectangular wave detector which carries out rectangular detection of this output, and outputs I component and Q component, The low pass filter which removes an unnecessary wave from these I component and Q component, and the A/D converter which changes this low pass filter output into digital value, In the receiver which has the digital-signal-processing section which inputs this A/D-converter output and reproduces an input signal The digital mobile radio receiver characterized by having the gain control section which is equipped with gain adjustable front-end amplifier between said low pass filters and said A/D converters, and controls the gain of said front-end amplifier according to the command from said digital-signal-processing section.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] Especially this invention relates to the receiver using limiter amplifier about a digital mobile radio machine.
[0002]
[Description of the Prior Art] As the receiver of the conventional digital mobile radio machine is shown in drawing 2 , it is an intermediate frequency signal IF 0. The intermediate frequency filter 1 which band-limits by inputting, Intermediate frequency filter output IF 1 Intermediate frequency output IF 2 by which amplitude limiting was amplified and carried out Limiter amplifier 2 to output, Limiter amplifier output IF 2 Rectangular detection is inputted and carried out and it is the I component I0. And Q component Q0 The wave detector 3 to output, It is I0 and Q0, respectively. It inputs and is I1 and Q1. The low pass filters 4 and 5 to output, It is I1 and Q1, respectively. It inputs and is the A/D-conversion value I2 and Q2. A/D converters 7 and 8 to output, I2, and Q2 It has the digital-signal-processing section 10 which inputs and performs signal regeneration.
[0003] A received wave is once changed into an intermediate frequency signal, and the topology of I and Q can be acquired by carrying out rectangular detection of the limiter amplifier output after that. Low pass filters 4 and 5 are for removing an unnecessary wave from these [I] and Q component. And in order to reproduce an input signal from I and Q component, once it changes into digital value with an A/D converter, it is necessary to perform digital signal processing.
[0004]
[Problem(s) to be Solved by the Invention] This conventional receiver is the output IF 2 of the limiter amplifier 2. Since it is maintained at the fixed amplitude by amplitude limiting, it is IF1. If the interference component contained becomes large relatively to the wave component of choice, the wave component input level of choice of a wave detector 3 will decline absolutely. Then, if a wave detector 3 is a line type, it is the output I0 and Q0. The wave component of choice will also fall absolutely. then, effectual, in order that the input level to A/D converters 7 and 8 may decline, even if the subsequent low pass filters 4 and 5 remove an interference -- resolution fell and there was a problem of causing degradation of a receiving property. The purpose of this invention is to offer the digital mobile radio receiver which prevented the fall of resolving power when limiter amplifier is saturated by the interference, and prevented degradation of a receiving property.
[0005]
[Means for Solving the Problem] This invention is equipped with gain adjustable front-end amplifier between a low pass filter and an A/D converter, and it constitutes it so that the gain of this front-end amplifier may be controlled by the gain control section according to the command from the digital-signal-processing section.
[0006]
[Function] By controlling the gain of front-end amplifier, the input level of an A/D converter is set always constant, and degradation of effectual resolution is prevented.

[0007]
[Example] Next, this invention is explained with reference to a drawing. Drawing 1 is the block diagram of one example of this invention, and has given the same sign to the same part as the conventional configuration of drawing 2 . Namely, as for a low pass filter, and 7 and 8, for limiter amplifier and 3, a rectangular wave detector, and 4 and 5 are [1 / an intermediate frequency filter and 2 / an A/D converter and 10] the digital-signal-processing sections. And while connecting the front-end amplifier 11 and 12 with gain respectively strange good here among said low pass filters 4 and 5 and A/D converters 7 and 8, the gain control section 9 which controls the gain of said front-end amplifier 11 and 12 in response to the signal from said digital-signal-processing section 10 is formed.
[0008] According to this configuration, it is the output I2 of A/D converters 7 and 8, and Q2. It reads into the digital-signal-processing section 10, and judges [input I1' of A/D converters 7 and 8, and] whether the level of Q1' is suitable there. And when this is not suitable, gain control of the front-end amplifier 11 and 12 is performed for the information about this level to the gain control section 9 delivery and here. By doing in this way, the input level of A/D converters 7 and 8 is maintained at always suitable level.
[0009] The situation of this actuation is concretely shown in drawing 3 . In addition, only I component after rectangular detection is shown here. Moreover, D is a wave spectrum of choice and U is an interference spectrum. As shown in (a), when only the wave of choice inputs, it is an intermediate frequency IF 1. It is amplified with the limiter amplifier 2 and is IF2. It becomes and is IF2. It is in the condition which required the limiter by the wave of choice. The rectangular detection output I0 Since an interference component is not included, it is the signal I1 after low pass filter 4 passage. I0 The same wave and the amplitude attenuation only for an insertion loss of a low pass filter 4 are only received. Gain of the front-end amplifier 11 at this time is set to 1 by making this condition into reference condition.
[0010] As shown in (b), when a bigger interference than the wave of choice exists on the other hand, it is an intermediate frequency IF 1. It is amplified with the limiter amplifier 2 and is IF2. It is IF2 although it becomes. It is in the condition which required the limiter by the interference. The rectangular detection output I0 When an interference component is dominant and it is removed by the low pass filter 4, it is the output I1 of only the wave of choice. It is obtained. However, I1 at this time Level is I0. In order to receive the attenuation beyond the insertion loss of a low pass filter 4 compared with level, compared with the case of (a), the amplitude becomes small. Then, the A/D-converter input level of the next step can be kept constant by making gain of the front-end amplifier 11 larger than 1. In addition, the example of a flow chart of the digital-signal-processing section is shown in drawing 4 from level presumption of A/D-converter input I1' to a gain setup of the front-end amplifier 11.
[0011]
[Effect of the Invention] It has the effectiveness that an input signal can be detected and it can reproduce with the same resolution as the case where the low pass filter after rectangular detection removes an interference, and there is no interference even if the limiter amplifier of IF stage is saturated with an interference, since this invention forms gain adjustable front-end amplifier and he is trying to keep the input level of an A/D converter constant as explained above.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

TECHNICAL FIELD

[Industrial Application] Especially this invention relates to the receiver using limiter amplifier about a digital mobile radio machine.

[Translation done.]

JAPANESE [JP,05-244025,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS OPERATION EXAMPLE DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

EFFECT OF THE INVENTION

[Effect of the Invention] It has the effectiveness that an input signal can be detected and it can reproduce with the same resolution as the case where the low pass filter after rectangular detection removes an interference, and there is no interference even if the limiter amplifier of IF stage is saturated with an interference, since this invention forms gain adjustable front-end amplifier and he is trying to keep the input level of an A/D converter constant as explained above.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] This conventional receiver is the output IF 2 of the limiter amplifier 2. Since it is maintained at the fixed amplitude by amplitude limiting, it is IF1. If the interference component contained becomes large relatively to the wave component of choice, the wave component input level of choice of a wave detector 3 will decline absolutely. Then, if a wave detector 3 is a line type, it is the output I0 and Q0. The wave component of choice will also fall absolutely. then, effectual, in order that the input level to A/D converters 7 and 8 may decline, even if the subsequent low pass filters 4 and 5 remove an interference -- resolution fell and there was a problem of causing degradation of a receiving property. The purpose of this invention is to offer the digital mobile radio receiver which prevented the fall of resolving power when limiter amplifier is saturated by the interference, and prevented degradation of a receiving property.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

MEANS

[Means for Solving the Problem] This invention is equipped with gain adjustable front-end amplifier between a low pass filter and an A/D converter, and it constitutes it so that the gain of this front-end amplifier may be controlled by the gain control section according to the command from the digital-signal-processing section.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

OPERATION

[Function] By controlling the gain of front-end amplifier, the input level of an A/D converter is set always constant, and degradation of effectual resolution is prevented.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the block diagram of the important section of the digital mobile radio receiver of this invention.
[Drawing 2] They are some block diagrams of the conventional digital mobile radio receiver.
[Drawing 3] It is drawing for explaining actuation of the configuration of drawing 1 .
[Drawing 4] It is the flow chart which shows actuation of the digital-signal-processing section of drawing 1 .
[Description of Notations]
1 Intermediate Frequency Filter
2 Limiter Amplifier
3 Rectangular Wave Detector
4 Five Low pass filter
7 Eight A/D converter
9 Gain Control Section
10 Digital-Signal-Processing Section
11 12 Front-end amplifier

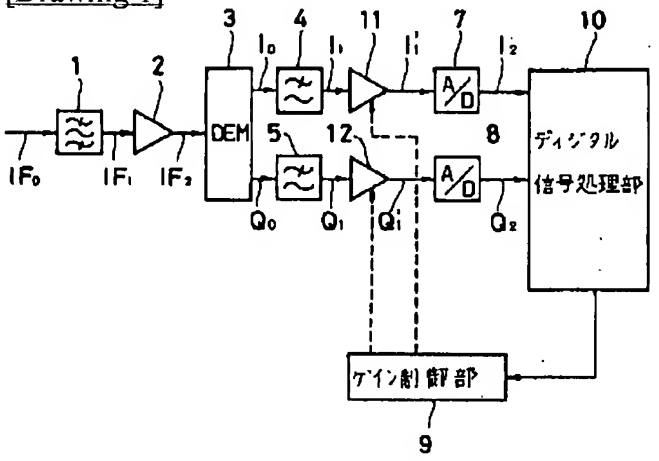
[Translation done.]

* NOTICES *

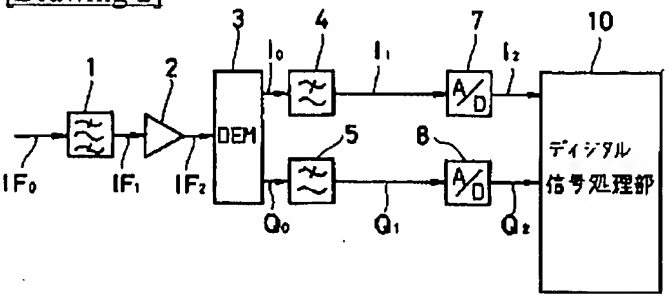
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

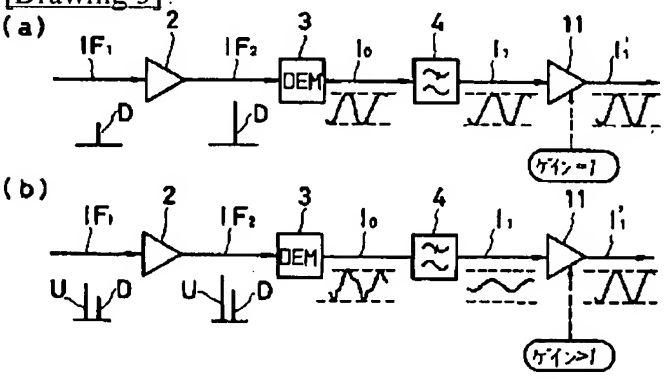
[Drawing 1]



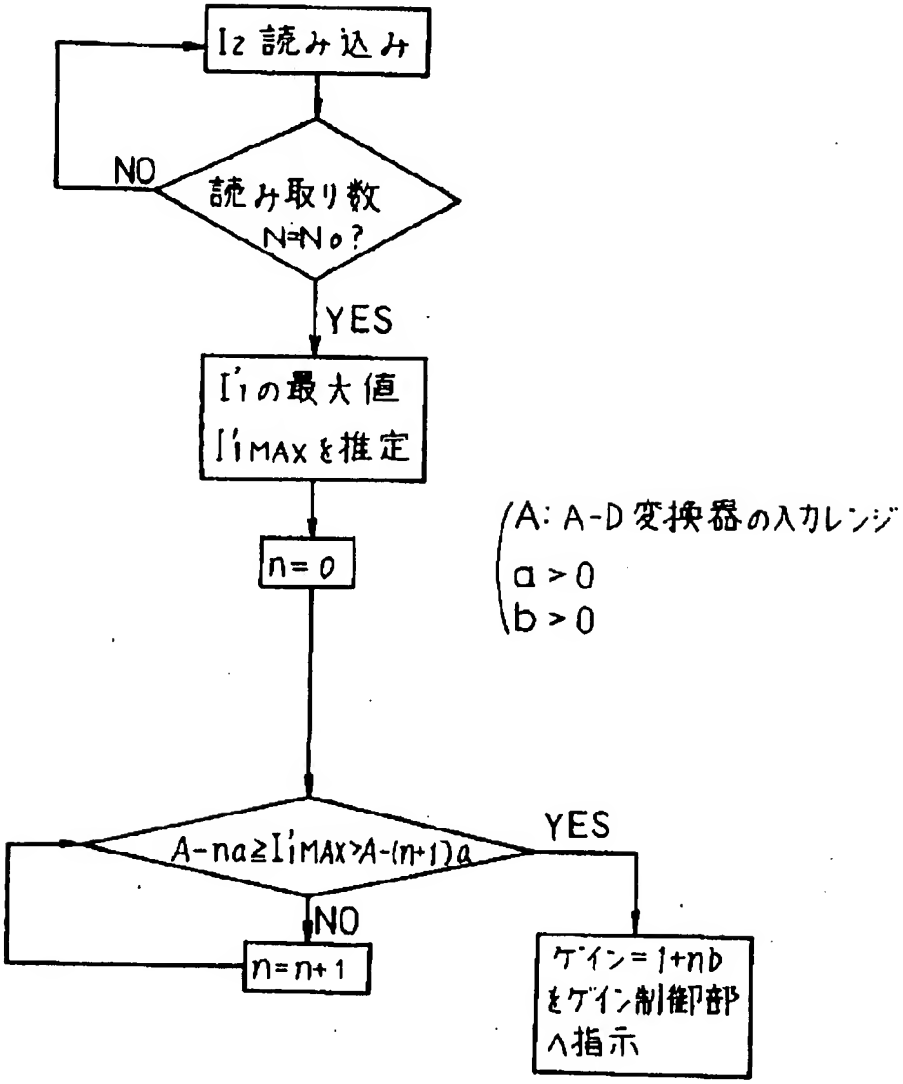
[Drawing 2]



[Drawing 3]



[Drawing 4]



[Translation done.]